Claims

1. Oligonucleotide for genotyping and pathotyping the species *Pseudomonas aeruginosa* with a nucleic acid sequence, selected from the group consisting of (all sequences in 5' → 3' direction):

i)

GAAGCCCAGCAATTGCGTGTTTC
GAAGCCCAGCAACTGCGTGTTTC
GGTGCTGCAGGGTGTTTCGCCGG
GGTGCTGCAGGGCGTTTCGCCGG
CAAGATCGCCGCAGCGGTCAAC
CAAGATCGCCGCTGCGGTCAAC
TGCTGCTGGCGGCGGTGTGCTAT
TGCTGCTGGCAGCGGTGTGCTAT
CCTCGCCCTGTTCCCACCGCTCTGG
CTCGCCCTGTTCCCGCCGCTCTGG
TCGAGCAACTGGCAGAGAAATCCG
CGAGCAACTGGCGGAGAAATCCG
GCGGAAAACTTCCTGCACATGATGTT
GCGGAAAACTTCCTCCACATGATGTT
AGCTCAGCAGACTGCTGACGAGG
AGCTCAGCAGACCGCTGACGAG
AAGAGGACGGCCGCCGGGTGACGCC
AAGAGGACGGCCGCCAGGTGACGCCG
GACAAGATGCGCCTCGACGACC
GACAAGATGCGTCTCGACGACCG
AGCCGACCTACGCGCCGGGCAG
CAGCCGACCTATGCGCCGGGCAG
CCGTTCGAACGGCTCATGGAGCA
GCCGTTCGAACGACTCATGGAGCA
TGGAGCAGCAAGTGTTCCCGGC
TGGAGCAGCAACTGTTCCCGGC

GAACAAGACCGGTTCCACCAACGG

AACAAGACCGGCTCCACCAACGG

GCGACCTGGGCCTGGTGATCCT

GCGACCTGGGACTGGTGATCCT

GCCGACCAACTGAACTCCAACTCG

GTCGCTGAACGGCACCTACTTCA

CAGCCTGCGGTCATGTCCTCGG

CGCCAGTTTGAGAACGGAGTCACC

GCGCGATCTTCTCCACTTCATCGG

GCCTCCGCGATTGAACATCGTGAT

GTAGCCGGAGTCGAGCGGAATCAT

GTGAGCATGGAATCGGCAGTCGTT

CGAGGAGTTTCGGACCCGCTTTGA

AATAGGACCGGCAGAACGGGCATT

GCGCCTTCTCCTCTTTGCAGATGT

CAGTATGGTACGGACACGAAGCGC

GCATCATTGCGCGTCACATCTGGT

TCTGAACTGCGGCTATCACCTGGA

AATTGATGGCTTCTCAGGCGCAGG

AGTCATGGGACTGAATACGGCGACT

TTCTCGGTGTCGAGGGATTCTCGG

TGGTAGCTCTCGACGTACTGGCTG

CCCGTTGCTCATAACCCGTTCCTG

AGGGCATTCTCAGGTGGACTCAGG

ACCTGTGTCGCTGGAGGGTATGTT

AGCGTCCCTGACCAACCTCATCAG

CGCCAACAATTCGCCATTACAGCG

TCCAACAGGCAGGAGTACAGGGTG

CGCTGCACATACAGGTCCGTTCTC

AGCCCAGCAATTGCGTGTTTCTCCG

AGCCCAGCAACTGCGTGTTTCTCC

GCTGCTGGCGGCGGTGTGC

TGCTGCTGGCAGCGGTGTGCT

CAGAAAGCTCAGCAGACTGCTGACGAG

GAAAGCTCAGCAGACCGCTGACGAG

ACGGCCGCCGGGTGACGCC

ACGGCCGCCAGGTGACGCCG

GCCGACCTACGCGCCGGGC

AGCCGACCTATGCGCCGGGCA

GTTCGAACGGCTCATGGAGCAGCA

GTTCGAACGACTCATGGAGCAGCAAG

CAGCCCAGTCAGGACGCGCA

AGTGACGTGCGTTTCAGCAGTCCC

GTGTCACGGCCCATGTCTAGCAGC

CGAAGTCTGAGGTGTGGACCCGC

CGCTGGAGGGTATGTTCCGCAAGG

CGTACTCAGCTTCTCCACCCAGCG

CCTGGACCTCTCCAAGGTTCGCCT

GCCATTCCGACGACCAAACAAGGC

GTGCTGCAGGGTGTTTCGCCG

GCTGCAGGGCGTTTCGCCG

CAAGATCGCCGCAGCGGTCAACGAC

CAAGATCGCCGCTGCGGTCAACGAC

GCTCAGCAGACTGCTGACGAGGCTAACG

GCTCAGCAGACCGCTGACGAGGCTAAC

CGACCTACGCGCCGGGCAG

CGACCTATGCGCCGGGCAGC

CGTTCGAACGGCTCATGGAGCAG

CGTTCGAACGACTCATGGAGCAGC

CGACCTGGGCCTGGTGATCCT

GCGACCTGGGACTGGTGATCCTGG

CAGTTGTCGCCAGGTCTGGAGAATCC

CACATCAATGTCAGCCCACGCCA

CTGGAGCCTGCGAAAGTGGCTC

ACGAGGGTGATGGCTGGGAATACG

GCCAATTGGGTCAGCAAGCAACG

CGTGTCGCGAACTCGCATGGC

AGGCCATGGGCTAGCCGGATGC

CGAAGCGTAGGGTCTTCGTAGCC

TGCGAGGACCAGAAACCTTGATGG

CGGTATGAAGATGGGTGGTTGGGTCG

CCTGAATCCGACCATTCGCGAGTC

TCGGACTGTACTCCTACGAAGCAGC

CCAATCCCTATCGCTGGAACCGTACC

GCTCGGGACTCGCATTTCGTCC

GCGTTATTGCTCGGTCTCTCCTCG

TGCATAGGAGTCATGCCGACAGCA

GCCTGCCTACTTGTTCCCAACGC

GGCTGTATTGCCCGCCATTCTCC

CGACAGACAGAAAGGGTTCTTGCGC

CACCATGCAAATGCTCGATGGACTGC

GCAGGCGTCCAAGTTGGAGCTCTCC

GGAACACAACGTGGGGCGTGAC

CCAGTTGGCACCACCATGCTTGC

GACCGCAAGCAGAAACGGCATGC

CCATGGTCGGAACAGGCACGATATGC

CCACTCGATCATGTTGAGCATCGGCTCC

GGTTAGTCCCTTCTGCCCGCATCG

ii) oligonucleotides matching one of the oligonucleotides under i) in at least 60%, preferably in at least 80%, and particularly preferably in at least 90%, 92%, 94 %, 96% of the bases and allowing specific hybridization with nucleic acid sequences of bacterial strains of the species *Pseudomonas aeruginosa*,

iii) oligonucleotides differing from one of the oligonucleotides under i) and ii) in that they are extended by at least one nucleotide, and

iv) oligonucleotides hybridizing with a sequence, which is complementary to an oligonucleotide under i), ii) and iii), under stringent conditions.

2. Microarray device comprising a support element, on which oligonucleotide probes are immobilized on predetermined regions, for specifically detecting bacterial strains of the species *Pseudomonas aeruginosa*.

3. Device according to claim 2,
characterized in that the device is a reaction tube having a shape and / or size typical for a laboratory reaction tube and having a support element, on which oligonucleotide probes are immobilized on predetermined regions, arranged on one of its base areas for specifically detecting bacterial strains of the species *Pseudomonas aeruginosa*.

4. Device according to claim 2 or 3,
characterized in that the oligonucleotide probes are selected in such a way that they detect 30% to 70% of the population of *Pseudomonas aeruginosa* strains in each case.

5. Device according to any one of claims 2 to 4,
characterized in that the oligonucleotide probes are specific for nucleic acids having a base substitution compared to the sequence of the reference strain of *Pseudomonas aeruginosa*.

6. Device according to any one of claims 2 to 5,
characterized in that the oligonucleotide probes are specific for nucleic acids present in only one or few strains of the species *Pseudomonas aeruginosa*.

7. Device according to any one of claims 2 to 6,
characterized in that the oligonucleotide probes are specific for nucleic acids present in pathogenicity islets in the genome of *Pseudomonas aeruginosa*.

8. Device according to any one of claims 2 to 7,
characterized in that the oligonucleotide probes are specific for nucleic acids present in disease-associated genes like *exoS* and *exoU*.

9. Device according to any one of claims 2 to 8,
characterized in that the oligonucleotide probes are specific for nucleic acids contained in genes coding for flagella of *Pseudomonas aeruginosa*.

10. Device according to any one of claims 2 to 9,
characterized in that the oligonucleotide probes are selected from the oligonucleotides according to claim 1.

11. Method for specifically detecting bacterial strains of the species *Pseudomonas aeruginosa* in a sample, comprising the following steps:
a) contacting the sample with a nucleic acid chip in a microarray device according to any one of claims 2 to 10; and
b) detecting the interaction between the oligonucleotide probes and the target nucleic acids contained in the sample.

12. Method according to claim 11,
characterized in that the target nucleic acids contained in the sample are amplified before the detection.

13. Method according to claim 12,
characterized in that the amplification is performed by means of multiplex PCR.

14. Method according to claim 13,
characterized in that primers, which have similar melting points and / or similar binding kinetics, are used for the amplification.

15. Method according to any one of claims 12 to 14,
characterized in that the amplification is performed linearly.

16. Method according to any one of claims 12 to 15,
characterized in that the primers are selected with a nucleic acid sequence selected from the group consisting of (all sequences in 5' → 3' direction):
ACGCGGATGTCCTGGATTTGG
CTGAAGAAGGGGCGCTACGCGGCGTACCGGGCAAGGTGATAGCTCGGTGAAACA
TCGGGAGGGTCATCCAGCAAGCCATTGCGCGGAGTCGCTTTCCGCCATCGTGGAG
TCGCTTTCCGCCATCGAAGGGCGTTTCACGCTGACGC

ATCCGGAAGGGCGTTTCACG

TCCACACCTCAGACTTCGGCG

TATTGACGACCTACCGCGCGC

GCAACTGATGTTCGCCCAGC

CGCAACTGATGTTCGCCCAGC

ACACGCAACTGATGTTCGCCC

TGTCCCGGCTCAGTTCAACG

AACACCTTGGCGTTTGTCCC

GCAACACCTTGGCGTTTGTCC

TCAAGCTCGTTGTGGACCGC

GTTACGACGGCGTGCTGTCGG

ACGCAACGTATTCGGCGACCC

CGCAACGTATTCGGCGACCC

AGCTGATGGTATCGCCGTCGC

CTAGTGATCGCACCGGAGCC

AGCCTCGACACCGGTTCTCG

TCGTTCATCCCCAGGCTTCG

ACCATCTCGTTCATCCCCAGG

TTCTGAGCCCAGGACTGCTCG

TCGACGCGACGGTTCTGAGCC

TGACGTTCTCGCCGGTAGCG

CAGTAGCGGTACCGGTCTGCG

CAGTAGCGGTACCGGTCTGC

TTCCTCGCCGGCATAGTAGGC

CGAGGACGAGGCATCTTCCGG

GCAGGTAGCAGGTTTCCAGG

AACTGTTCCTTCTGCGCGGCG

TGATCGGCTTGGTCTCGCAGG

GCTGATCGGCTTGGTCTCGC

GAGGCGTTCTGCTCGTGGTCG

TTTTTCCAGCATGCGCAGGG

GCTGGCTTTTTCCAGCATGCG

TTGCGGCTGGCTTTTTCCAGC

TTGGGATAGTTGCGGTTGGC

CGTAGGCGATCTTCACCCGC

TGGCGTAGGCGATCTTCACCC

GGCGAGATAGCCGAACAGGC

GCGGCGAGATAGCCGAACAGG

CACTTGCTGCTCCATGAGCC

GAGGTCGAGCAGGCTGATGC

TAGGTCGCGAGGTCGAGCAGG

GTCCTTCTGCACCGAGTCGG

CGCATCTTGTCCTGGGTCAGG

TCGTCGAGGCGCATCTTGTCC

ACGTCGAGGTGGGTCTGTTCG

GTAGCCTTCGGCATCCAGCG

TCGGCATTGGGATAGTTGCGG

CCTCCTGTCTCATGCCGATGC

GCATTCGCCACGGAAGGAAGG

GAAGGCATCATGGCATTCGCC

GTCATGGGGTTTCCCAGAGACC

GATCGCGATGTCGACGGTGCC

CGATCGCGATGTCGACGGTGC

TGCCGATCGCGATGTCGACG

GACGAATACCCAGCTGCGTGG

GCAGACGAATACCCAGCTGCG

CGCGACGTCGTGACGTCAGC

ACTTTCGGCTCTTCGGGCTGG

AGGTAGAGACTCGGGGGAACC

TCGTTTTCGGTCATGGCCAGG

TTCCGCGACGAACATCCGTGG

CGCTTCCGCGACGAACATCCG

GGATCGCTTCCGATAGGGCAGC

AGAGGCATGGGTCTGTACCG

TCTGTCAATCCCCTTTGGGG

AGCCCCTTTCTGTCAATCCCC

GGCTTCCTACCGAAGGTCAGG

TGAGGGCTTCCTACCGAAGG

TTCAAGGTCATGGGCAATGCC

AGTCCCTTCAAGGTCATGGGC

GCCGACTGAGCTGTAGCTCGG

GGCCGACTGAGCTGTAGCTCG

ACCAGACTGGTCAATGGTGG

CCCGTGTTTCCGTAGACCTTGC

AGCAGTTACCCACAGCATGG

CAGCAGTTACCCACAGCATGG

CTACACTCCAACCGCTGGTCC

GACCTACACTCCAACCGCTGG

TTCCCTTGCTGCCGAGAAGC

TAATAGGCGAGCCTGCCGTCC

TCCACGCCGAGGGACGTGCC

GCTCCACGCCGAGGGACGTGCC

CGCGGTGCTGGTTGCGCTGC

CCAATGCCCAGGGCCAGCGGA

CGCTGGCAGTTCCGCTGGCC

CAGGGTCGCCAGCTCGCTCGCC

AGGGTCGCCAGCTCGCTCGC

AGTGATCTGCCGCGGCCCTGCC

GTGATCTGCCGCGGCCCTGC

GTTCCACAGGCGCTGCGGCGC

GTTCCACAGGCGCTGCGGCG

CAAAGCCCCTGGTCGCGCGG

GCAGCTTTTCCACCGCCGGCGG

AAACTGCCCCGCCCCCCATCC

GGAAAAACTGCCCCGCCCCCC

ACGCTCGCAGCGCCTCACGCG

GGCCTGGCTGCGAACGCTCGC

GGGGTCGAGACGTGTACATGG

TTCCTGGGCCAGAGTTGGACC

AGCTTAAGGCCGTGGCACTCG

CCGGAGAATTCGCGTCCACC

TGCTGACGATGAAGCCCCAGC

AGGAGGCCGATGACAACACCC

TGCCGATTCCATGCTCACGCC

ACGACGTCACCGTCGAGACCG

ACCGCCTTTCTGGTGAGCTGG

AGCCAAGACGGTTGTTCGCGG

TCAATGACGCCGAGTTGGCGC

CTCGGACAGGTTCACGCTGG

GCCATTCGCTGCAACACCTCC

GCGCGCGTTCGAGAAACAGG

CGGAGGTTGAAAAGCTGGCCC

ATGCCATCGTTGAAGGCACCGC

TGCCATCGTTGAAGGCACCG

TCTGGCGGAATCAGGTAGGCC

CTTCCGGGGAGAAACCACCG

ACCTCCAGCACCGACACACC

ATCCGATCCACCTCCAGCACC

CGTTCAGGTCGTAGACCGCGC

GCGATACCAACTGTCCTGCGGC

TGCCGAAGGTGAATGGCTTGCC

CCTGATGGTCCGATCCCAGC

GCCGAGGGTCAAGAACCACTGG

TCTTGGCCCAGTCATAGCGGC

TAACCCCAAGGCCCATTGGAGG

GCCACCGCCTTCGAATAACCCC

AATTGCTCGAGGGATGCGGC

GGTCGAAACGGATGCGCAGG

GCCCCGCGTCATTTTCACGTCG

AATGCTCTGGGCAACGAGCC

CTACCCAGCTTGGGCGTAGC

AAGCGATAGCCGTGCTCCTGC

CCGGCTATATCCGCGGCTACC

ATTGGCGCTGCTGTTTACGCCC

GGTGGCGTCGGGTTTTTCTGC

AGGTCGTAGCGGAAGGTGGTGG

ATCTGAACCGAGGGGATCCGC

CCCGGGAGTCATTGGTCTGG

GCCTGTTGGACCCCTTTGACC

TACTCCTGCCTGTTGGACCCC

CGCTCAAGCGCTATCCCACC

CGCCATCGGCCTGTACAACG

CGGTAGAGAGCTGGGTTGGC

AACCTGGAGCTAGGGCAGAGC

GGTGCTCGACCCAAGCATCG

TCCTTGAGTTCCTTGGCGCGG

CAACACGCGACTGGCGATCC

TACATCATCCGCAACGGCGGC

TATTGACGACCTACCGCGCGCC

CACCAAGAACCCGCTGCTCG

ATCGTGGCAGGATGTCCACCG

TAGGCGGGCCTTTTGAAGGTGC

17. Use of the oligonucleotides according to claim 1 for specifically detecting bacterial strains of the species *Pseudomonas aeruginosa*.

18. Use of the oligonucleotides according to claim 1 or of the device according to any one of claims 2 to 10 or of the method according to any one of claims 11 to 16 for genotyping and pathotyping *Pseudomonas aeruginosa*.

19. Use of the primers according to claim 16 for amplifying nucleic acids of bacterial strains of the species *Pseudomonas aeruginosa*.